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PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF

PHILADELPHIA.

No. 3.—Sept., Oct., Nov., Dec., 1870.

PHILADELPHIA:
ACADEMY OF NATURAL SCIENCES,
Corner of Broad and Sansom Streets.
1870.

Merrihew & Son, Printers, 243 Arch St., Philadelphia.

NOTICE TO STUDENTS OF NATURAL HISTORY.

The children of the late Augustus E. Jessup, wishing to carry out the intention of their father, " pay to the Academy the sum of four hundred and eighty dollars per annum, to be used for the support of one or more deserving poor young man or men, who may desire to devote the whole of his or their time and energies to the study of any of the Natural Sciences."

Several young men furnishing evidence of requisite qualifications, on application to the Curators may receive benefit from the Jessup Fund.

dal; the head three and a half times. The eyes are large, the diameter being contained only three and a half times in the length of the head. The supramaxillary ends under the posterior border of the pupil. The surface of the intermaxillary has four larger equidistant conical teeth, directed forwards, and a smaller one on each side and farther back, between the external and internal; the surface of the mandible has also four conical processes. The dorsal commences nearly over the anus; its height at least equals three fourths of the head's length.* The anal commences nearly under the third dorsal ray. The pectorals extend beyond the anus, and the ventrals, which are inserted nearly midway between the axils of the pectorals and the origin of the anal, extend to about the third ray of the latter.

The scapular spot is very distinct; the caudal indistinct. The fins, especially the pectorals, minutely punctuated between the rays.

I dedicate this specimen to Mr. Philip V. Myers, a travelling companion of Prof. Orton, in compliance with a request of the latter gentleman.

HYDROLYCUS COPEI, Gill.

D. 11. A. 43.

The height enters $2\frac{3}{4}$ times in the length (exclusive of the caudal), the length of the head $3\frac{1}{3}$; the profile between the nape and convex snout is moderately incurved; the interorbital space is slightly arched, and about equal to the orbit, the snout, and a quarter of the head's length. The maxillary passes considerably behind the vertical of the posterior border of the orbit. The dorsal fin commences above the anus. The pectorals pass for a third of their own length beyond the axillæ of the ventrals, and the ventrals extend backwards to the third or fourth anal ray.

The lateral spot is faint, and above the lateral line, just in advance of the vertical of the anus.

Four specimens, the largest of which is four and a quarter inches long, were obtained in the Napo and Maranon rivers.

I dedicate this species to my esteemed friend, Prof. Cope, in recognition of his important contributions to herpetology and ichthyology.

Subfamily SERRASALMONINÆ.

PYGOCENTRUS ALTUS Gill.

P. 17. V. 7. D. 17. A. 33.

The height of the body is contained about 3 4-5ths in the length, exclusive of the caudal; the length of the head (measured from the prominent lower jaw) about $2\frac{3}{4}$. The back declines very slowly towards the nape of the neck, and thence is boldly decurved downwards. Snout obtuse, less than the diameter of the eye. The diameter of the eye equals a fifth of the head's length, and the interorbital width enters $2\frac{1}{3}$ in the same distance. The second suborbital bone is separated from the preoperculum by a lunate naked area. There are fourteen teeth in each jaw. The origin of the dorsal fin is nearer the eye than the root of the caudal; its height is less than half the head's length. The origin of the anal is under the last dorsal rays. The pectorals scarcely reach the bases of the ventrals; the latter are two thirds as long as the former. Gill-rakers of the outer branchial arch short and pointed like those of the other arches. Abdomen armed with about twenty-seven serratures.

The color is greyish, iridescent, and tinged with blueish; there is no well defined scapular spot, but the region above the operculum is darker.

Nearly related to *P. scapularis* (Serrasalmo scapularis *Gthr.* v. p. 368).

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* The anterior dorsal rays are broken.

Family *SILURIDÆ.*

Subfamily PIMELODINÆ.

Rhamdia dorsalis Gill.

B. 6. P. I. 8. V. 6. D. I. 6. A. 9.

The body is moderalely slender; the height rather exceeding a fifth of the length (exclusive of the caudal), while the height of the caudal peduncle is about an eleventh. The head forms rather more than a fourth of the length, and is about three fourths as wide as long, or more than twice as wide as the interocular area; the skin is moderately thick and smooth; and the supraoccipital spine is pointed and extends beyond the vertical of the bony opercular margin. The eyes enter about eight times in the head's length, are entirely in the anterior half of the head, and are about equally distant from each other and the middle of the upper jaw. The upper jaw projects but little beyond the lower. The intermaxillary band of teeth is widest near the angles, where it is truncated and obtusely angulated, and rather narrowest at the middle; the greatest width exceeds a sixth of the length. The intramandibular flaps are considerably wider than the dentigerous bands. The maxillary barbels extend to or beyond the middle of the ventrals; the external mandibular extend beyond, and the internal nearly to, a line with the bases of the pectorals.

The dorsal fin is oblong, the longest rays equalling the distance from the second to the axilla. *The adipose fin is contained between three and four times in the length.* The pectorals terminate under the second or third dorsal ray, and are not much larger than the ventrals. The porus axillaris is very minute.

The color is dark brown. The dorsal has the usual broad clear basal band.

Sorubimichthys Ortoni Gill.

B. 14, 14 D. I. 6. A. 13. C. iii, I, 7, 8, I, iv. P. I. 10. V. 6.

The head forms rather more than a third of the length, exclusive of the caudal fin; the outline above is oblong, convex in front; the width is less than half its length, and the width between the orbits less than a third; the hinder margin of the orbit is midway between the snout and opercular flap; the profile is perfectly straight. The dentigerous area of the upper jaw projects almost entirely beyond the lower jaw, and equals the chin or two diameters of the orbit; it is uninterrupted, except behind at the middle, where there is a broad but shallow triangular sinus; the palatal bands externally describe half an ellipse, and are only interrupted at the middle by a linear furrow widening backwards into a hastiform sinus; their antero-internal angles are, however, rounded. The maxillary barbels extend to the anal; the external mandibular terminate at some distance from the pectoral fins, and the internal are less than the width of the upper jaw.

The dorsal spine is unarmed, or scarcely rough behind; the adipose fin obliquely truncated, shorter than the anal and nearly coterminal with it; the pectorals terminate nearly under the last dorsal ray, and in advance of the ventrals, than which they are considerably larger. The caudal is shorter than the head, the lobes are acutely prolonged, and the upper lobe is somewhat larger than the lower.

The color is ashy with a broad silvery band bounded above by a narrower blackish one, which is bifurcated in front, and below by a still narrower one, or rather a series of partly confluent spots; numerous spots, generally much smaller than the eyes, cover the entire upper portions of the body and head, as well as the dorsal, adipose, and pectoral fins.

This species is among those described most closely related to *S. Artedii* (Platystoma Artedii *Gthr.* = Mystus No. 6 *Artedi*), but the length of the barbels and coloration at once distinguish it, and still more decided differences may appear on re-examination of the latter, the dentition and other characteristics not yet being known.

SCIADES MARMORATUS Gill.

B. 9. P. I. 10. V. I, 5. D. I, 10. A. 11.

The head is little longer than broad. The diameter of the eye is contained nine or ten times in the head's length. The vomerine teeth are in two oval patches, nearly as large as the eye, and separated by a moderately narrow interval; the palatine patches are transversely oval, and smaller than the pupil of the eye. The maxillary barbels extend beyond the base of the caudal; the external mandibular beyond the tips of the pectorals, and the internal beyond the bases of those fins. The dorsal fin is three fourths as high as the head is long. The adipose fin is half as long again as the dorsal.

The ground color is greyish, and forms meandering lines between the large blackish spots by which it is covered. All the fins are similarly colored, but the spots at the base of the dorsal are fused into a band. The barbels are indistinctly annulated.

Closely allied to *S. longibarbis* (Arius? longibarbis *Castlenau*), but appears to be distinguished by the longer adipose fin and the number of rays; it may, however, prove to be only a form of that species. Castelnau has doubtless overlooked the two small areas of teeth on the palate.

Subfamily CETOPSINÆ.

CETOPSIS VENTRALIS Gill.

P. 10. V. 6. D. 1, 6. A. 29.

The greatest height enters 4½ times in the length exclusive of the caudal, and 5½ times inclusive thereof. The head enters 4⅓ times in the length exclusive of the caudal fin, and 5½ inclusive of it; its breadth does not exceed half its length. The gape is continued under the entire eye. The teeth are in a villiform band on the lower as well as upper jaw, and on the vomer. The ventrals are inserted entirely behind the vertical of the dorsal, and are connected together by a membrane which is, however, closely connected with the abdomen along the middle, and is not free even at the margin; the extremities of the fins extend to or beyond the anus. The barbels are nearly equal and about two or three times as long as the diameter of the eye.

The color is greyish, darker above; the basal half of the dorsal is punctulated with black.

This species is most closely related to *Cetopsis gobioides* Kner, but is distinguished hy the more compressed head, posterior ventrals, and longer anal.*

Subfamily TRACHELYOPTERINÆ.

CENTROMOCHLUS STEINDACHNERI Gill.

P. I, 7, D. I. 5. A. 7.

The greatest height equals two thirds of the length of the head, which itself enters about 3¾ times in the total length, exclusive of the caudal. The eyes are moderately large, the diameter equalling a quarter of the head's length. The maxillary barbels are nearly coterminal with the elongated pectoral fins. The dorsal buckler behind is cordate, and its branches expand inwards and extend as far back as the third soft ray. The height of the dorsal is not much less than the head's length; its spine is obsoletely serrated behind. The pectorals equal nearly a third of the length, and do not reach the ventrals. The ventrals are inserted midway between the branchial apertures and the base of the caudal. The caudal is forked.

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* The number of anal rays is not given by Kner, but the figure represents twenty-two.

Color greyish, tinged with silvery on the sides.

The species is eminently distinguished from its congeners by the form of the dorsal buckler; it is most nearly related to *C. megalops*.

I dedicate this species to the meritorious ichthyologist and herpetologist Dr. Franz Steindachner, as a slight recognition of his labors.

Sept. 6th.

MR. VAUX, Vice-President, in the Chair.

Seventeen members present.

The following paper was presented for publication:

"Notice of some Crustaceans of the Genus Libinia, with descriptions of three new species." By T. Hale Streets.

PROF. LEIDY stated that he had just returned from a short visit to Boston and Cambridge, and that while there he had had the opportunity of examining the collection of Mastodon remains of the Warren museum and the Cambridge University museum, which had so much interested him, that he thought a brief notice of them would be interesting to the members.

The private museum of the late Dr. Warren, now in possession of his heirs, contains a magnificent skeleton of the American Mastodon (*M. americanus*), the best preserved and most complete which has yet been found. It was discovered in 1845, at Newburgh, N. Y. It is that of a mature male. The jaws contain the last two molars on both sides, besides the tusks above, and one of those below, together with the alveolus of that of the opposite side. This skeleton forms the basis of Warren's book on the Mastodon, published in 1852.

Besides the skeleton indicated, Dr. Warren's museum contains the skull of another, a well preserved specimen, found in Orange Co., N. Y. It is even larger than that of the skeleton, and also pertained to a mature male. The jaws contain on both sides the last two molars; and on one side the fourth molar is also retained. The specimen is described and figured in Warren's book on the Mastodon. (Pls. xvi, xviii, xix.)

The Warren collection further contains a number of other remains of Mastodon, mainly fragments of jaws with teeth, isolated molars, and casts in plaster of others. I may add it also contains a number of molars of the American Elephant (*Elephas americanus*), together with many vertebræ of the Basilosaurus.

The museum of the University of Cambridge contains the most interesting series of remains of the American Mastodon which I have yet seen collected together in one place. The most important of these are as follow:

1. A skeleton, discovered, in 1844, in Warren Co., N. J. It pertains to a mature female. The jaws contain the last two molars on both sides, and no traces of inferior tusks remain.

2. A complete skull of what I take to have been a female approaching maturity. The jaws contain the fourth and fifth molars in functional position. The sixth molar had not protruded and is visible within the jaws. On one side of the lower jaw the third molar is retained but is nearly worn out. On the other side and in the upper jaw the alveoli of the corresponding teeth are partially obliterated. The incisive sockets of the lower jaw are likewise obliterated. (The specimen is represented in plates v, vi, of Warren's book on the Mastodon.)

3. Another complete skull of an animal younger than that of the preceding

specimen. The jaws contain the third and fourth molars in functional position. The fifth molar had not protruded and is visible within the jaws. The alveoli of the second molars are partially obliterated, and this is the case also with the inferior incisive alveoli. (Represented in pls. iii, iv, xvii, of Warren's book.)

4. A lower jaw of a quite young animal. It contains the first, second, and third molars in functional position and but little worn. The crown of the first molar has two transverse divisions; that of the second, two principal transverse divisions and a less well developed or rudimental third division; that of the third molar has three divisions. Large sockets for incisive tusks occupy the sides of the symphysis. (The specimen is represented in plate ii of Dr. Warren's work.)

An examination of many specimens of jaws and teeth of the American Mastodon leads to a confirmation of the view that the dental series consists of an incisive tusk and six molars on each side of both jaws. Whether the usual upper tusks are preceded by a temporary pair has not been determined. Small lower tusks appear to belong to the young of both sexes, but are lost and their alveoli obliterated in the female, while one or both are frequently if not usually retained permanently by the male.

The molar teeth in the order of protrusion successively follow one another from behind, but none of the series of six appear to have vertical successors.

The young animal exhibits the anterior two and then three molars together with tusks in both jaws, in functional position. As the third and fourth molars assume a functional position the first and second are shed, and as the fifth molar protrudes the third is shed. With the functional existence of the fifth and sixth molars the fourth is shed. Finally, in the old animal the sixth or last molar may alone remain, though usually the fifth and sixth appear to have been retained to the last.

In the Museum of Comparative Zoology of Harvard College, Prof. Shaler exhibited some Mastodon and other vertebrate remains, the results of his explorations at Big-bone-lick, Ky. Prof. Shaler incidentally informed me that he had detected no evidences of glacial action in the latter region. He supposes that the specimens of teeth and tusks, the wearing off at the sides of which I formerly attributed to glacial action, probably had been imbedded in stiff clay in the pathway of Mastodons, to whose tread the wearing was due.

The collection contained a multitude of remains of the Bison, but these Prof. Shaler found more superficially than those of the Mastodon and Elephant, and not associated with them. With the remains of the latter two genera were also found those of *Bootherium cavifrons*, of which the collection contains a skull without the face. There were also found with these some remains of the Horse, and also the fragment of a lower jaw, which appeared to me to belong to the existing Domestic Hog.

In referring to *Bootherium* I may add that I had the opportunity of examining a skull of the recent Musk Ox, preserved in the Museum of the Natural History Society of Boston, the first complete skull of the animal I have ever seen. In this skull I observed that the lachrymal fossa in advance of the orbit is a shallow depression even less distinct than in the Sheep. In *Bootherium* it is a deep, well defined hemispherical depression, being as different from that of the recent Musk Ox as is that of the Deer.

In the same museum, besides a few Mastodon remains, I remarked several molars of the American Elephant, interesting from their size. One of them, apparently a last upper molar, is from Brazos R., Texas, and is of the coarse plated variety, corresponding with the *Elephas columbi* of Falconer. The triturating surface is flat, not terraced, ten inches by four and three quarter inches in extent, including the enveloping cementum, and also fourteen and a half worn lobes or double plates. Behind, are four additional unworn and less well developed lobes. The breadth of the tooth obliquely is thirteen inches; the depth posteriorly to the broken root, eight inches.

Another molar is from St. Mark's River, Florida. It is an inferior one, and of the coarse plated variety. The grinding surface is irregular or terraced, eight and a half inches long, four inches wide; and it includes eleven lobes or double plates. Five additional unworn lobes succeed. The breadth of the tooth is ten and one-half inches; its depth to the root, eight inches.

Taking advantage of my proximity, I went to Amherst, and spent a couple of hours with Prof. C. N. Shepard in examining the Museum of Amherst College.

Prof. Shepard has recently collected together many interesting fossil remains of vertebrata. Among these are a multitude of specimens obtained by his son from St. Helena Island, and the famous Ashley River deposits of South Carolina. Those from the latter locality consist mainly of Zeuglodonts, Cetaceans and Fishes, but also include remains of Mastodon, the Elephant, and of *Equus major* and *E. fraternus.* The St. Helena Island fossils consist of bones, fragments of jaws and teeth of the Mastodon. Among them were noticed two inferior tusks, which measured about ten inches in length and two inches in diameter at the base.

The same collection contained a large molar of the American Elephant, of the coarse plated variety, from California. Some remains of Mastodon from the latter place struck me from their peculiarity, and these Prof. Shepard was so kind as to loan to me for examination and description.

One of the specimens, which lies on the table, is the fragment of a tusk from "Dry Creek," Stanislaus Co., California. It indicates a species totally different from the American Mastodon, and in its peculiarities exhibits a relationship with the *Mastodon angustidens* of the middle tertiary period of Europe. The fragment is six inches in length, is slightly curved in two directions, and in transverse section is ovate with the anterior pole acute. The pulp cavity, opening half the diameter at the broken base of the specimen, extends about half its length to the end. The convex side of the tusk possesses, as in *Mastodon angustidens*, a broad band of enamel, which reaches from the acute edge more than two-thirds the depth of the surface. The enamel is somewhat rugose and is two-thirds of a line thick. At one spot, towards the smaller end of the fragment, it has been irregularly worn through for the extent of about an inch and a half. The opposite side of the specimen, from the acute edge, has been worn off to an extent about equal to two-fifths of the surface. The broken ends of the fragment exhibit very conspicuously the beautiful arrangement of decussating curved lines so characteristic of the ivory in the tusks of the great proboscidians.

The vertical diameter of the base of the fragment is 28 lines, the transverse diameter 19 lines; the vertical diameter at the opposite end is 22 lines, the transverse diameter 16 lines. The entire length of the tusk appears to have been less than two feet.

The question arises as to what species the tusk fragment shall be attributed. It certainly does not belong to the common American Mastodon, nor is it probable that it belonged to the pliocene *Mastodon mirificus.* May it probably pertain to the hardly known *Mastodon obscurus ?* In the present uncertainty I would look on the specimen as characteristic of a peculiar species, allied to the *M. angustidens* of Europe. For the name of the species I would propose that of MASTODON SHEPARDI, in honor of Prof. C. N. Shepard, whose name has so long been identified with the interests of natural history.

The second specimen, exhibited to the members, consists of a fragment of a lower jaw containing the last molar tooth, and was discovered in Contra Costa county, California. No information in regard to the age of the deposit, or the character of the locality in which the fossil was found, accompanies it. The bone is friable, and measures, below the position of the tooth, five and a half inches in depth. Attached to the fossil there is a portion of soft gray rock, part of the matrix in which it has been imbedded. The tooth is perfect and well preserved. It has the same general form and constitution as the corresponding tooth of the American Mastodon, but is considerably smaller. It bears sufficient resemblance to the plaster cast (represented in fig. 14, pl. xxvii., of "The Extinct Mammalian Fauna of Dakota and Nebraska, &c,") of a tooth, the original of which is lost, from a miocene formation of Maryland, to be viewed as pertaining to the same species. This I had named *Mastodon obscurus*.

The crown of the tooth consists of four transverse divisions together with the merest trace of a heel. As in the cast of the Maryland tooth, the inner lobes of the crown of the California tooth are more mammillary, and less angular than in *M. Americanus*. The outer lobes, likewise as in the Maryland tooth, have better developed offsets fore and aft internally than in the latter, giving rise to a greater degree of obstruction of the transverse vallies of the crown than in the American Mastodon. The fourth division of the crown is proportionately less well developed, in comparison with those in advance, than in the latter, agreeing also in this respect with the Maryland tooth. The outer lobe of this division is formed of a pair of connate mammillary tubercles, as in the latter, but the tubercles are more equally developed. The inner lobe is a single mammillary eminence not more than half the elevation of the outer lobe. In the Maryland tooth, the corresponding lobe resembles the outer one, consisting of a connate pair of tubercles as well developed as in the outer lobe. The heel in the California tooth, as in the Maryland tooth, is formed by a short mammillary eminence occupying the angular space posteriorly of the lobes of the fourth division of the crown. A basal ridge is better developed externally in the California than in the Maryland tooth.

Comparative measurements of the California tooth, with the cast of the Maryland tooth, and one of the *Mastodon americanus* are as follows :

	California tooth.	Maryland tooth.	Mastodon americanus.
Fore and aft diameter of the crown of the last molar tooth	6 in. 4 lines.	6 in. 4 lines.*	7 in. 3 lines.
Transverse diameter of do.....	2 in. 9 lines.	2 in. 9 lines.	3 in. 4 lines.
Depth of do. internally.........	2 in. 2 lines.	2 in. 2 lines.	3 in. 0 lines.

It is not improbable that the California tooth may have pertained to the same species as the fragment of tusk previously noticed, and, perhaps these, together with the Maryland tooth, and others previously referred to *Mastodon obscurus* may likewise belong to the same animal. The positive determination of this question must be left for the discovery of additional material to throw light on the relationship of the different specimens which have been thus far presented to our notice.

Sept. 13th.

The President, Dr. Ruschenberger, in the Chair.

Twelve members present.

The following paper was presented for publication :

"On the flowers of Aralia spinosa and Hedera helix." By Thos. Meehan.

Sept. 20th.

The President, Dr. Ruschenberger, in the Chair.

Twenty-three members present.

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* Partially estimated, as the specimen is imperfect at its fore part.

Prof. Leidy, exhibited the fragment of a jaw of a Crocodile, recently sent to him for examination by Prof. F. V. Hayden, now engaged in geological exploration of part of our western territories. The specimen, together with a multitude of small fragments of bones, scales, and teeth of ganoid and other fishes, was found at the junction of the Big Sandy and Green River.

The fragment from the fore part of the jaw indicates an animal about the size of the Alligator of the Mississippi, and apparently a head of nearly the same form. The external surface of the jaw is exceedingly rough and pitted. Two entire teeth, and the remains of two others are retained in the specimen. The larger of the perfect teeth, apparently, holding the position corresponding with a canine, has a blunt conical crown strongly carinated fore and aft, and with the enamel finely rugose. The length of the crown is 8 lines; its diameter antero-posteriorly 7½ lines; and transversely 6¼ lines. The specimen pertains to an extinct species, probably different from any heretofore indicated. The character of the formation from which it was obtained and its geological age I have not learned.

I propose to dedicate the species to Mr. Henry W. Elliott, a young and able artist, attendant on Prof. Hayden's expedition, with the name of Crocodilus Elliotti.

Prof. Leidy stated that during the last summer he had made some further observations on *Urnatella*, a genus of ciliated polyps of the family Pedicellinidæ, discovered by him some years ago (Pr. Ac. Nat. Sc. 1851, 321; 1854, 191) in the Schuylkill River. It is found abundantly below the dam at Fairmount, adhering to stones and rocks, on the sides and under part not in contact with the ground. Occasionally it is observed attached to the shell of the living *Unio complanatus*, and *Melania virginica*, and less frequently to the stem of *Schollera graminea* and the leaves of *Vallisneria spiralis*. In the locality named, on the rocks, there may be observed, in association with *Urnatella*, the following animals: *Spongilla fragilis; Limnias ceratophylli*, usually abundant and in compound bunches; *Cothurnia pusilla*, parasitic on *Urnatella* and *Limnias; Hydra carnea*, Ag., *Paludicella elongata*, *Plumatella vesicularis;* and the worm *Manayunkia speciosa*, etc.

Unlike the marine genera of Pedicellinidæ, the polyp stocks of *Urnatella* are erect or semi-erect, and not prostrate or creeping attached along the surface of bodies. *Urnatella* starts by a thin membranous disk or expansion tightly adherent to the point of support. Usually two stems or stocks (occasionally three or only one,) start from the same disk, and diverge from each other in a gentle curve. The stems may be seen from a simple pedicle without division, to a series of eleven divisions or segments, exclusive of the polyp head. A colony of *Urnatella* recalls to mind a miniature patch of plants in a flower garden. The smallest polyps are translucent whitish or nearly colorless; the largest are less than two lines long, and alternately white and blackish or brownish. When disturbed the polyps retract their arms, hang their heads, and bend downward, so that the heads touch the basis of support, or the stems even become somewhat involute. Voluntarily the polyps are often observed abruptly to move from one side to the other in the most singular manner, as if wearied of remaining too long in the same position. In these movements the stems bend the entire length, but there is no contraction or shortening. In attempting to detach a polyp, the heads suddenly bend downward in such a manner as if the violence elicited a feeling of pain in the animal.

The terminal two or three segments of the parent stems usually give off a branch on each side, and this branch sometimes gives off a second. The branches always consist of a pedicle or single joint supporting a polyp head.

In a polyp stock of more than two divisions, independent of the polyp head, the additional segments are urn shaped. The penultimate segment is barrel shaped; the last one cylindrical, or clavate.

The polyp heads are provided with from a dozen to sixteen ciliated arms.

The internal structure of the polyps including that of the stems, bears a resemblance to that of *Pedicellina*, and will be more particularly described in a memoir preparing on the animal.

The youngest independent polyp stems of *Urnatella* consist of a simple cylindrical pedicle starting from the disk of attachment to the rock, and supporting a single polyp head. The pedicle elongates and divides into two segments. The ultimate segment grows in length and again divides; and in this manner all the segments are produced. After the production of three segments, the antepenultimate segment assumes the urn form. Budding commences from the second and third segments after their production, and from the succeeding segments, but not usually from the first segment. The buds originate from opposite sides of the base of the segments, and form branches of a single segment with a polyp head. The pedicle of these branches also frequently gives off a bud, which forms a secondary branch of the same kind as the primary ones.

In the longer *Urnatella* stocks, branches are usually observed only from the one two or three terminal segments. In the posterior urn-shaped segments, in the position in which branches emanate in the terminal segments, cup-shaped processes are observed. These were formerly mistaken for buds, but evidently result from the dehiscence or separation of branches, which leave the parent stock to establish colonies elsewhere. Though I have not observed this separation take place in *Urnatella*, yet all the points of structure appear to indicate that it actually takes place in the manner intimated.

It thus appears that the first step towards the multiplication of *Urnatella* is the segmentation of its stem. The segments put forth buds which develop polyps, and these then separate from the parent stock to settle elsewhere, and become the source of other series of polyps.

The ultimate history of the segmented polyp stock of *Urnatella* I have not ascertained. The stocks which I have preserved in an aquarium for several months finally lose their terminal polyps. Late in the season, also, all the polyp stocks which I could obtain on the river shore within the reach of my arm, at low tide, were deprived of their terminal polyps. The destruction of these, however, I have suspected to have been due to their having been uncovered in lower tides earlier in the season. I hope yet to be able to determine this question in the course of the next few weeks.

It has occurred to me that the segmented stems of *Urnatella* after the decay of the polyps, remained through the winter with little obvious change, and that in the following season, the segments served as reproductive bodies, in the same manner as the statoblasts in Plumatellidæ and their allies. This view is, however, not confirmed by specimens retained in the aquarium, and those collected on the edge of the river which had lost their polyps.

In relation to the production of ova, or the reproduction of *Urnatella* through sexual agency I have yet learned nothing.

Among the animals mentioned, as found in association with *Urnatella*, is the singular Annelide, *Manayunkia speciosa*, discovered by me some years ago, (Proc. A. N. S., 1858, 90.) The worm is closely allied to the marine genus *Fabricia*, and like it, lives in tubes constructed of mud. It is abundant in the locality indicated. Individuals of about two lines in length, are usually seen in a state of division near the middle into two. The anterior division of the body consists of five bristle-bearing annuli in addition to the head. The posterior division consists of six bristle-bearing annuli in addition to the partially developed head. The anterior head is provided with about thirty-six ciliated tentaculi supported on four lobes. It is also furnished with a pair of eyes; besides which the tentacle-bearing lobes exhibit a number of pigmentary spots, apparently of the nature of eyes. No eyes exist in the tail of *Manayunkia* as they do in *Fabricia*. The blood is green and is pumped intermittently into a large vessel occupying one tentacle on each side of the middle of the head.

I have studied the development of *Manayunkia*, which will be fully de-described in a future memoir on the animal. Curiously enough the development of the young takes place within the tube of the parent, and the young remain in this position for a considerable time after their development. Thus I have obtained the young from the tube of the parent, after it was one-third of a line in length, and consisted of ten annuli, including the head, from which projected ten tentacles.

Mr. Thomas Meehan said that last year he had called the attention of the Academy to the fact that *Gymnocladus* and some other plants had a series of buds, not in the usual order of *Phyllotaxis*, accordant with the leaves, as we have believed axillary buds ought to be; but in a direct line, one above another; and that in these cases the upper bud, the one the farthest removed from the axil, was the strongest bud. He had overlooked the fact long known to botanists, until pointed out by Dr. Engelman, that *Lonicera* had this longitudinal string of buds; but in this case the largest bud was the one nearest the axil. He had since noted that these buds all followed the same law in this, that it was the large buds which had a flower-producing character, while the small ones were those which continued the axial growth.

By the help of this last observation he was now able to explain some facts in *Solanaceous* plants which he believed had not hitherto been understood. It was well known that many of these had a habit of producing their flower scapes at varying positions between the nodes, and not at the nodes, as is usual with most flowering plants. He exhibited specimens of the common Cherry Tomato, in which a few of the flower clusters sprang apparently opposite to a node, but the majority were at least one-fourth of the way down to the node below; also other species of the genus, in which the flower peduncle pushed out almost down to the lower axil. This was especially the case in some Egg plants, wherein the leaf axil, the axillary bud, and the bud producing the flower peduncle, were closely together in a direct line, as in *Gymnocladus*, before noted. The point to which he wished the particular attention of the members was that this internodular flower bud really belonged to the system of buds apparently originating at the node below.

He then showed that the flowering character of *Solanum* had a numerical law of its own. Every third node produced a flower spike or cluster. The node next following the flower had barely the rudiment of an axillary bud; the second one had a stronger bud; the third had a bud which in the Tomato and Eggplant pushed again into axillary growth, and had the extra bud beyond, before noted—the flowering one. Other *Solanaceous* plants had similar characters, which, unless we remembered what we had learned in these common *Solanums*, we might not understand. For instance, in *Nycterium violaceum* the two nodes between the flowering one approached very close together, so as to appear nearly opposite, but still one axillary bud stronger than the other. In *Datura* all three nodes approached and formed a sort of fascicle with the flower proceeding from the irregular centre of the mass.

He now exhibited some specimens of the common Poke weed, *Phytolacca decandra*, and showed that the inflorescence was exactly on the same law. The flower raceme only appeared at every third node, and sometimes was as much as a quarter of an inch above the node. It was directly in a line with the lower bud, as in the cases of *Gymnocladus*, *Lonicera*, *Solanum*, &c., and there was no difficulty in assuming that the flower spike had really belonged to the lower system, just as in the other cases. The ratio of vigor in the axillary buds was just the same. The leaf opposite or near by the raceme had scarcely any axillary bud; the next stronger; the next strong enough to push into a secondary axillary growth; and then the flower above this. In this we saw *Phytolacca* to have the same characters as *Solanaceous* plants. The seeds of *Phytolacca* were of very similar structure to *Solanum*, and it had many other characters in common. He was not prepared to speak positively without further investigation, but thought it quite likely, in spite of the hypogynous flower, *Phytolacca* would be found more nearly related to *Solanaceæ* than to *Chenopodiaceæ*, near which it was now placed.

He then exhibited some shoots of Grape Vine, and said that Dr. Engelman had pointed out, when at the Academy last year, that there was some numerical order in the tendrils of grape vines. In the specimen he exhibited every third node had no tendril; but he had seen some grape vines in which as many as eight nodes with tendrils had followed one another. In the mature wood, however, those without tendrils perfected the strongest buds. But he had found in the allied genus *Ampelopsis* a nearly regular system of buds and tendrils. In *A. hederacea*, the common Virginia or five fingered creeper, the strong shoots running up a wall or tree had at every third node a strong axillary bud, *without any tendril;* while the two intervening nodes had tendrils *without axillary buds.* Occasionally, but very rarely, two successive nodes would have axillary buds, in which case the lower one would be smaller, and have also a small tendril on the opposite side. *Ampelopsis Vietchii* had the same character. He had attempted to propagate this by using nodes from which the tendrils pushed, as single bud cuttings, but failed to get any development from the axils. He believed they had not a trace of a bud in even the most rudimentary state. It had been said in Darwin's paper on motion in tendrils that the gland on the end of the tendril did not develop itself until it approached the object it was to cling to. In *Ampelopsis Vietchii*, they developed before this, in the shape of small globes, looking like rudiments of the same flower which ultimately appeared. In fact tendrils here were incipient flower branches, as any one could see by tracing the common *Ampelopsis hederacea* up to its final flowering condition, when, the axial growth ending in a terminal bud, instead of the usual lateral tendril, it seemed to erect itself and bear flowers. It would seem as if it was only by the elongation of the axis, demanding and drawing to itself nutriment which would otherwise go into the tendril, which made it a tendril, and not a flower shoot.

He did not, however, intend at this time to attempt any explanation of these series of observations. He thought there was nothing in any known law of *Phyllotaxis* which would explain them; and that by following them up matters of much interest to botany might be evolved. But, as he might have more to say about it some day, and winter was approaching, he thought to call the attention of the Academy to the facts, so that those interested might examine them for themselves before the frost destroyed the specimens.

The death of Mr. Wm. P. Wilstach was announced.

Sept. 27th.

The President, Dr. Ruschenberger, in the Chair.

Twenty-one members present.

The report of a Committee appointed to draft resolutions regarding the death of the late Wm. P. Wilstach was received, and the following Resolutions adopted:

The death of William P. Wilstach, at Saratoga, Sept. 17, 1870, has been announced to the Academy of Natural Sciences of Philadelphia.

Mr. Wilstach during his connection of ten years with this institution has been distinguished among its members by his liberal, intelligent and prompt encouragement of every enterprise calculated to increase and diffuse knowledge of the Natural Sciences. Besides many donations at different times, he gave a thousand dollars towards the publication of the last volume of the Academy's Journal; a thousand dollars to the building fund, and in addition he made a conditional subscription of five thousand dollars to the same fund. These facts are cited in evidence of Mr. Wilstach's interest in the progress of

Science and culture;—they are among the reasons why the Academy recognizes in his death the loss of a liberal patron, a judicious counsellor and an agreeable associate.

Resolved, That this expression of the Academy's appreciation of Mr. WILSTACH's worth be communicated to his widow and family, in token of its sympathy with their bereavement.

W. S. W. RUSCHENBERGER,
JOS. LEIDY,
(Signed) WM. S. VAUX.

S. B. HOWELL, Rec. Sec.

The following gentlemen were elected members of the Academy: Green Smith, Thos. Stewardson, H. Weir Workman, W. B. Rogers, Thos. G. Gentry, Wm. H. Pancoast, M. D.

The following were elected correspondents: Prof. Igino Cocchi, of Florence, Italy; Prof. John Jas. Stevenson, Ph. D., of Morgantown, W. Va.

On favorable report of the Committees, the following papers were ordered to be published:

Notice of some Crustacea of the Genus LIBINIA, with descriptions of four new Species.

BY T. HALE STREETS.

Much uncertainty has existed with regard to the identity of certain species belonging to the genus Libinia. *Libinia dubia*, ever since it was first established by Milne Edwards, has been regarded as a doubtful species. In the description of it by Edwards, he states that it resembles *L. canaliculata* very much, and that it is not improbable that it is the young of that species. Naturalists in this branch of science down to the present time appear to have accepted this statement as the truth.

De Kay, in his Natural History of New York, states that the "younger individuals, 1—4 in. in length, are more pyriform in shape, are entirely covered with a dense, downy hair, and the spines are not so prominent as in the adult. In this state I suppose it to be the *L. dubia* of Edwards."

Gibbes in an article in the Proceedings of the American Association for 1850, regards the two species as distinct, but says that no absolute characters can be indicated by which they may be separated.

I do not know how to account for this prevailing ignorance, as the characters existing, separating the two species, are so plain.

LIBINIA DUBIA, Edwards. His. Nat. des Crust. vol. 1, p. 300, pl. 14, fig. 2.
L. distincta, Guerin.

Besides the characters usually given as distinguishing this species, the following may be observed, and they will be found to be highly characteristic.

In the median line of the body, counting backward from the depression separating the gastric and genital regions, there is a row of four spines; one on the genital region, two on the cardiac and one on the intestinal. One small spine on the posterior part of the gastric region in the median line, and five arranged transversely on the anterior part of the same region. Three prominent spines on the branchial region independently of those on the lateral margin. The *hepatic region* is usually devoid of spines or tubercles; sometimes there is a very small, sharp one on each side, or, again, it may be present on one side and absent on the other. There is never more than one on a side. The regions are very distinctly marked out.

Rostrum prominent. Its bifurcated extremity diverging, and directed nearly horizontally. The cleft deep.